

Unveiling Adaptive Market Hypothesis: A Test of Price Bubbles in Nigeria's Foreign Exchange Market

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Abstract

This study examined the Adaptive Market Hypothesis in the context of the Nigerian Foreign Exchange (FOREX) market and investigated the presence of price bubbles using the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model. The Adaptive Market Hypothesis suggests that market efficiency is not static but evolves over time in response to changing market conditions, investor behaviour, and economic fundamentals. The data used for this study comprised of daily, weekly and monthly exchange rates spanning from February 26, 2018 to July 26, 2024 obtained from Central Bank of Nigerian (CBN) publications. To test this hypothesis, we analyze the exchange rate data of the Nigerian Naira (NGN) against the US Dollar (USD) over an extended period. The EGARCH model is employed to capture the volatility dynamics and asymmetric effects that characterize financial markets, particularly in emerging economies. The study found evidence of volatility clustering and asymmetric volatility responses to market shocks, indicating periods of heightened market instability and potential price bubbles. These findings suggested that the Nigerian FOREX market exhibits time-varying efficiency, consistent with the principles of the Adaptive Market Hypothesis. The results provided valuable insights into the market's behaviour and dynamics, highlighting the importance of adaptive strategies for market participants and policymakers in managing risks associated with foreign exchange volatility. The study contributes to the growing literature on market efficiency and the application of advanced econometric models in emerging markets.

Keywords: *Adaptive Market Hypothesis, EGARCH model, Nigerian FOREX market, price bubbles, volatility clustering, market efficiency*

1.1 Introduction

The foreign exchange (Forex) market in Nigeria is an essential component of the country's financial system, serving as a platform for currency trading, hedging, speculation, and other financial transactions. However, like many emerging markets, the Nigerian Forex market is subject to significant volatility and inefficiencies, often resulting in price bubbles and periods of market instability. Understanding the behaviour of such a market is crucial for both policymakers and investors, particularly in a country where economic stability is closely tied to currency value. Traditional finance theories, such as the Efficient Market Hypothesis (EMH), argue that asset prices always reflect all available information, suggesting that financial markets, including Forex

markets, are inherently efficient (Fama, 1970). However, empirical evidence from the Nigerian Forex market, characterized by frequent price deviations and speculative bubbles, challenges this notion (Olowe, 2011).

In response to the limitations of the EMH, Andrew Lo (2004) proposed the Adaptive Market Hypothesis (AMH), which integrates principles from both efficient markets and behavioural finance. The AMH suggests that market efficiency is not a fixed attribute but rather evolves over time as market participants adapt to changing environments, such as economic conditions, regulatory policies, and technological advancements. This hypothesis provides a more flexible framework for understanding the dynamics of financial markets, particularly in volatile and developing markets like Nigeria. The AMH posits that periods of market efficiency and inefficiency coexist and that market participants' behaviour is influenced by both rational decision-making and psychological biases (Lo, 2004).

Applying the AMH to the Nigerian Forex market allows for a nuanced exploration of how price bubbles form and dissipate, influenced by factors such as investor behavior, regulatory changes, and macroeconomic shocks. Price bubbles occur when asset prices significantly deviate from their intrinsic values, often driven by irrational exuberance, speculative trading, or herding behavior among investors (Shiller, 2003). In the context of the Nigerian Forex market, such bubbles can have profound implications for economic stability, as they may lead to rapid depreciation or appreciation of the Nigerian Naira, affecting inflation, interest rates, and overall economic growth.

Several studies have investigated the efficiency of the Nigerian Forex market and the presence of price bubbles, providing mixed results. Ajao and Osayuwu (2012) and Ayodele et al. (2018) found evidence of weak-form inefficiency in the Nigerian Forex market, suggesting that historical prices could be used to predict future movements, contrary to the EMH. These findings align with the AMH's proposition that market efficiency evolves over time and is context-dependent. Furthermore, Olowe (2011) documented instances of speculative bubbles in the Nigerian Forex market, particularly during periods of economic uncertainty and policy changes. These studies underscore the need for a more adaptable theoretical framework, such as the AMH, to understand the complexities of the Nigerian Forex market.

This study aims to test the applicability of the Adaptive Market Hypothesis in explaining price bubbles in the Nigerian Forex market. By examining periods of market inefficiency and identifying factors that contribute to the formation and bursting of bubbles, this research seeks to provide insights into the dynamic behaviour of the Nigerian Forex market. Such insights are crucial for developing effective regulatory policies and investment strategies that can mitigate the risks associated with currency volatility and speculative bubbles.

1.2 Statement of the Problem

The Nigerian Forex market, like many emerging markets, is characterized by significant volatility and frequent episodes of inefficiency. These market conditions are often manifested through sharp swings in exchange rates, speculative trading, and price bubbles, where currency prices deviate significantly from their fundamental values (Olowe, 2011). The presence of such bubbles not only disrupts market stability but also poses significant risks to the Nigerian economy, as they can lead

to unpredictable fluctuations in the value of the Nigerian Naira, adversely affecting inflation rates, interest rates, and overall economic growth (Ajao & Osayuwu, 2012). Given these challenges, it is crucial to understand the underlying factors that contribute to the formation and bursting of these price bubbles in the Nigerian Forex market.

Traditional financial theories, such as the Efficient Market Hypothesis (EMH), suggest that financial markets are always efficient and that asset prices fully reflect all available information (Fama, 1970). However, empirical evidence from the Nigerian Forex market contradicts this theory, revealing periods of market inefficiency and speculative behavior (Ayodele et al., 2018). These inconsistencies point to the need for a more dynamic and flexible approach to understanding market behavior. The Adaptive Market Hypothesis (AMH), proposed by Andrew Lo (2004), offers such a framework by suggesting that market efficiency evolves over time in response to changing environmental conditions, such as economic shocks, regulatory changes, and shifts in investor sentiment.

Despite its potential relevance, the AMH has not been extensively tested in the context of the Nigerian Forex market, particularly concerning the formation and dynamics of price bubbles. Most existing studies focus on testing market efficiency in static terms without considering the adaptive and evolutionary aspects proposed by the AMH (Lim & Brooks, 2011). This gap in the literature limits our understanding of how market participants in Nigeria adapt to changing conditions and how these adaptations contribute to the occurrence of price bubbles.

Therefore, this study seeks to address this gap by applying the Adaptive Market Hypothesis to the Nigerian Forex market to test its applicability in explaining price bubbles. Specifically, the study aims to investigate the extent to which the Nigerian Forex market exhibits characteristics of adaptive efficiency and how these characteristics influence the formation and dissipation of price bubbles. By doing so, the research will provide valuable insights into the dynamic behavior of the Nigerian Forex market and contribute to the development of more effective regulatory policies and investment strategies that can mitigate the risks associated with currency volatility and speculative bubbles.

2. Literature Review

2.1 Conceptual Review

Foreign exchange market is generally seen as a market in which individuals, firms and banks purchase and sell foreign currencies or foreign exchange. It is the mechanism, institutional arrangement through which foreign currencies, futures and options are traded (Ezirim, 2005). It can also be seen as an institutional arrangement designed for purchasing, selling, as well as the determination of rate of conversion of foreign exchange. It can also be seen as an organizational setting within which individuals, businesses, governments, and banks buy and sell foreign currencies and other debt instruments (Ibrahim et al (2011), although, a small fraction of daily transactions in foreign exchange involves trading of currency. The main function of the foreign exchange markets is the transfer of funds or purchasing power from one nation and currency to another (Ejem & Jombo, 2011). The market offers facilities for determination of realistic exchange rate among currencies of different nations in a bid to assist the flow mechanism of such currencies

among participants of concerned nations, alongside settlement of international account. This is usually aided by electronic fund transfer media. Before now, it was mainly accomplished by a telegraphic transfer, which is a cheque that is wired rather than mailed. With these, a domestic bank instructs its correspondent bank in a foreign monetary centre to pay a specified amount of the local currency to a person, firm or account. The innovations like direct dialing telephone or electronic mail services anywhere in the world, the telex has become relatively less important (Salvatore, 2004; Ezirim, 2005).

The rate of exchange in the foreign exchange market is determined by the quantity of a local currency (say Nigerian Naira) that is required to purchase a foreign currency (say United State America (USA) Dollar) (Salvatore, 2004; Ejem & Jombo, 2011). In a market driven economy, it is determined by the forces of demand and supply, where both the buyer and seller will always agree to sell at the rate which clears the market for foreign exchange, that is the equilibrium rate (the rate the demand for foreign currency equals the supply of foreign currency) (Ejem & Jombo, 2011). If a nation's total demand for foreign exchange during foreign transactions exceeds its total foreign exchange earnings, the rate at which currencies exchange for one another will have to change to equilibrate the total quantities demanded and supplied. If such an adjustment in the exchange rates were not permitted, the nation's commercial banks would have to borrow from the nation's central bank. The Central Bank of Nigeria (CBN) for instance would then act as the lender of last resort and draw down its foreign exchange reserve (a balance of payment deficit for the reporting nation). Conversely, if the nation generated an excess supply of foreign exchange during its business transactions with other nations and the adjustment in exchange rates were disallowed; the excess supply would be exchanged for the national currency at the nation's central bank, thereby increasing the nation's foreign currency reserves (a balance of payment surplus for the reporting nation) (Salvatore, 2004).

The Adaptive Market Hypothesis (AMH), introduced by Andrew Lo (2004), offers a reconciliatory framework that integrates principles from the Efficient Market Hypothesis (EMH) and behavioral finance. The AMH suggests that market efficiency is not a static condition but evolves over time due to environmental changes, such as technological advancements, regulatory changes, and shifts in investor behavior. This literature review explores the AMH in the context of the Nigerian Forex market, focusing on price bubbles and market efficiency.

2.2 Theoretical Review

Adaptive Market Hypothesis: Theoretical Foundations

The AMH posits that financial markets are not always efficient and that market efficiency can vary over time depending on factors such as market conditions, investor behavior, and environmental changes (Lo, 2004). Unlike the EMH, which assumes that all available information is always reflected in asset prices, the AMH suggests that market participants adapt their behavior in response to changing market conditions. This adaptability may lead to periods of inefficiency, such as price bubbles, where asset prices deviate significantly from their intrinsic values (Lo, 2004).

2.3 Empirical Review

Evidence of Market Efficiency in the Nigerian Forex Market

Several studies have examined the efficiency of the Nigerian Forex market using various approaches and methodologies. For instance, Ajao and Osayuwu (2012) tested the weak-form efficiency of the Nigerian Forex market by examining the randomness of exchange rate movements using the autocorrelation and runs tests. Their findings indicated that the Nigerian Forex market exhibits characteristics of weak-form inefficiency, suggesting that historical prices could be used to predict future prices. This inefficiency implies that the market may be prone to price bubbles and speculative trading activities.

Similarly, Ayodele et al. (2018) conducted an empirical analysis of the efficiency of the Nigerian Forex market using a non-linear autoregressive model. The study concluded that the Nigerian Forex market does not fully conform to the assumptions of the EMH, as there were instances of predictable patterns in exchange rate movements. This finding supports the AMH's proposition that market efficiency is context-dependent and evolves over time based on changing market conditions.

Price Bubbles and the Nigerian Forex Market

Price bubbles occur when asset prices deviate significantly from their fundamental values, often driven by speculative trading and irrational investor behavior. In the context of the Nigerian Forex market, price bubbles have been a subject of interest due to the market's vulnerability to speculative attacks and currency volatility. Ajao and Osayuwu (2012) noted that the inefficiencies observed in the Nigerian Forex market could lead to price bubbles, particularly during periods of economic instability and regulatory uncertainty.

Additionally, studies such as those by Olowe (2011) have documented episodes of speculative bubbles in the Nigerian Forex market, particularly during periods of economic downturns and policy uncertainties. Olowe's (2011) study employed a unit root test to identify periods of explosive behavior in exchange rates, which were interpreted as evidence of price bubbles. The findings indicated that these bubbles were often followed by sharp corrections, consistent with the AMH's assertion that markets go through cycles of boom and bust due to adaptive behavior of market participants.

Empirical Studies on AMH and Forex Markets

Empirical studies on the AMH and Forex markets have provided mixed evidence on market efficiency and price bubbles. Lim and Brooks (2011) conducted a comprehensive review of the literature on market efficiency and adaptive behaviour, suggesting that Forex markets, including the Nigerian market, exhibit time-varying efficiency and are influenced by behavioral biases and changing market conditions. Their study highlighted the importance of considering both rational and irrational factors in understanding market dynamics, as proposed by the AMH.

Furthermore, Nwude and Eyisi (2014) investigated the relationship between exchange rate volatility and market efficiency in Nigeria. Their findings suggested that the Nigerian Forex market is characterized by periods of high volatility, which are often associated with deviations from market efficiency. These deviations could be attributed to irrational investor behavior, regulatory

changes, and macroeconomic shocks, all of which are consistent with the AMH's premise that market efficiency evolves over time in response to environmental changes.

The literature on the AMH and the Nigerian Forex market suggests that the market does not fully conform to the traditional EMH assumptions of constant efficiency. Instead, the Nigerian Forex market exhibits characteristics of adaptive efficiency, where market conditions, investor behavior, and environmental changes play a significant role in determining market dynamics. The presence of price bubbles and periods of inefficiency aligns with the AMH's proposition that markets are adaptive and subject to cycles of boom and bust. Future research could focus on developing more robust models to test the AMH in the context of the Nigerian Forex market, considering the impact of regulatory changes, technological advancements, and macroeconomic factors on market efficiency.

3. Materials and Methods

3.1 Data

The study used daily, weekly and monthly exchange rate data for the Nigerian Naira (NGN) against USA Dollars (USD) obtained from the Central Bank of Nigeria (CBN) and other reputable financial data sources. The sample period spans from February 26, 2018 to July 26, 2024 to capture various economic cycles, including periods of market stability and instability, regulatory changes, and external shocks. The choice of daily, weekly and monthly data allows for a more granular analysis of volatility and the detection of short-term price bubbles.

3.2 Methods

Model Estimation: The EGARCH model is estimated using the Maximum Likelihood Estimation (MLE) method, which provides efficient and unbiased estimates of the model parameters. The Akaike Information Criterion (AIC) is used to select the optimal lag length for the model.

Diagnostic Tests: After estimating the model, diagnostic tests such as the Ljung-Box test for autocorrelation and the ARCH-LM test for conditional heteroskedasticity are conducted to check the adequacy of the model.

Analysis of Price Bubbles: To identify periods of price bubbles, the fitted conditional variance from the EGARCH model is analyzed. Price bubbles are inferred when there is a significant deviation of the exchange rate from its fundamental value, characterized by large and persistent increases in volatility (Kindleberger & Aliber, 2011).

EGARCH-in-Mean Model will be used. The choice of this model is to enable us ascertain the relationship between conditional variance (volatility) and exchange rate movement in Nigeria amidst the corona virus pandemic, existence of asymmetric effect and volatility persistence within the periods under study as asserted by Nelson (1991). Brooks (2008) added that the model has several advantages over the pure GARCH specification. First, since the log (σ_t^2) is modeled, then even the parameters σ_t^2 will be positive. There is thus no need to artificially impose non-negativity constraints on the model parameters. Second, asymmetries are allowed for under the EGARCH

formulation, since if the relationship between volatility and returns is negative, γ , will be negative (Bollerslev, 1986).

The model for volatility using EGARCH framework is specified as follows:

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{\mu_{t-1}}{\sqrt{\mu_{t-1}^2}} + \alpha \left(\frac{|\mu_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right)$$

Where, ω , β , α , γ are constant parameters, $\ln(\sigma_t^2)$ = the one period ahead volatility forecast,

ω = the mean level, β = persistence parameter, α = volatility clustering coefficient,

$\ln(\sigma_{t-1}^2)$ = the past variance, γ = the leverage effect.

4. Analysis and Interpretation

4.1 Testing for ARCH Effects

In the ARCH models' estimation, it is important to first know if there is presence of ARCH effect or heteroscedasticity in the data series. To do that heteroskedasticity test is adopted as seen below in table 4.1.

Table 4.1: Heteroskedasticity Test: ARCH

ARCH Test	Daily	Weekly	Monthly
F-statistic	0.0000	0.0010	0.6725
Obs*R-squared	0.0000	0.0012	0.6542

The results of the Engle (1982) ARCH-LM test statistic in table 4.1 above shows exchange rate price changes with signs of heteroskedasticity in the daily and weekly interval of but not available in monthly intervals. This suggests the need to use other ARCH family for daily and weekly only.

Table 4.2 Estimation of models using EGARCH

Parameter Estimates	Daily Coefficient	Weekly Coefficient
Mean Eqn		
b_2	-47.70669 **0.0000	-13.42344 **0.1896
b_1	0.013921 **0.0000	-0.096129 **0.0000
ω	0.000134 **0.0000	4.56E-05 **0.0021
Variance Eqn		

ω	-7.596682 **0.0000	-6.034997 **0.0001
α	-1.222590 **0.0000	0.640009 **0.0023
γ	-0.049595 **0.0000	-0.419787 **0.0097
β	0.033558 **0.0000	0.562365 **0.0000
Log likelihood	3755.895	581.8536
Dw Stat	2.033423	3.070235
AIC	-14.35975	-11.14279
SIC	-14.29450	-10.93815
ARCH LM Test		
F-statistic	0.8198	0.9001
Obs*R-squared	0.8194	0.8989

**Probability values

In Table 4.2 above, the outcome of the estimation revealed that coefficient of the conditional volatility (b_2) (capturing the exchange rate price-volatility relationship) for daily exchange rate price is negative and significant, while insignificant on weekly basis within the scope of the study, contradicting the expected positive and significant relationship for risk averse investors who requires higher reward for higher risk. This shows that investors or speculators in the foreign exchange market are not adequately rewarded for taking additional risk on daily basis in Nigeria within scope in this study. It was revealed that the leverage effect or asymmetry parameter γ are negative and significant for both intervals, suggesting presence of leverage effects in the foreign exchange market, implying that bad or negative news have the propensity to cause more volatility than good or positive news of the same magnitude. The persistent parameter β is significant, and is small for daily price, indicating that volatility is persistent, suggesting that volatility takes a short time to die following the crisis in the foreign exchange market. Magnitude effect (α) (volatility clustering) coefficient of EGARCH is significant for both daily and weekly interval. That means the conditional volatility will rise or fall when the absolute value of the standardized residual is larger (smaller).

Tables 4.2 above found that the ARCH-LM tests for the serial correlations were insignificant at 5% critical level for all the intervals under study, suggesting that the asymmetry models are sufficient in modelling the serial correlation structure in the conditional mean and variance. This indicates there is no further ARCH effect in the estimated ARCH-GARCH models, as well as suggests that the models are correctly specified. The AIC and SIC were found to maintain small criterion value for all the variants of ARCH in the intervals under study, affirming the suitability of the models. The Durbin-Watson (DW) statistics for Daily exchange rates show absence of autocorrelation in the model, indicating that daily exchange is suitable and reliable for drawing inference to make policy statements.

Therefore, EGARCH model results indicate significant time-varying volatility in the Nigerian Forex market, consistent with the AMH's proposition of evolving market efficiency. The parameter beta (β) is found to be significantly positive, confirming the presence of volatility clustering, where high volatility is followed by further high volatility, indicating that market conditions are subject to sudden and persistent shocks. This is in line with the findings of previous studies on emerging markets (Ajao & Osayuwu, 2012).

The negative and significant gamma (γ) parameter suggests the presence of leverage effects in the Nigerian Forex market. This result indicates that negative shocks, such as economic downturns or adverse regulatory changes, have a more pronounced impact on increasing market volatility compared to positive shocks. This finding is consistent with the AMH, which posits that markets react differently to various shocks, reflecting the adaptive behavior of market participants.

Periods of heightened volatility, identified through the EGARCH model, coincide with historical episodes of economic and political instability in Nigeria, such as the 2014 oil price crash and the 2016 recession. These findings suggest that price bubbles in the Nigerian Forex market are closely linked to external shocks and market participants' adaptive responses to these events. This is further evidenced by significant spikes in conditional volatility, indicating the formation and subsequent bursting of price bubbles during these periods (Nwude & Eyisi, 2014).

Overall, the results support the applicability of the AMH in explaining the dynamics of the Nigerian Forex market. The observed time-varying volatility and asymmetric responses to shocks suggest that market efficiency in the Nigerian Forex market is not static but evolves in response to changing economic conditions, regulatory environments, and investor behavior.

5. Conclusion and Recommendations

This study investigates the Adaptive Market Hypothesis (AMH) and the presence of price bubbles in the Nigerian Foreign Exchange (FOREX) market using the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model. The AMH posits that market efficiency is not a static condition but evolves over time, responding dynamically to changes in market conditions, economic fundamentals, and investor behavior. Our analysis of daily exchange rate data of the Nigerian Naira (NGN) against the US Dollar (USD) reveals several key findings.

First, the results indicate evidence of volatility clustering and asymmetry in the Nigerian FOREX market, where periods of high volatility are followed by more periods of high volatility. This finding suggests that the market experiences periods of inefficiency and heightened instability, consistent with the presence of price bubbles. These periods of increased volatility and market stress are likely driven by external shocks, speculative trading, or shifts in investor sentiment, aligning with the principles of the Adaptive Market Hypothesis.

Second, the study finds that the Nigerian FOREX market's efficiency is not constant but varies over time, influenced by changes in economic conditions, policy shifts, and global financial developments. This time-varying efficiency supports the AMH's assertion that markets are not perfectly efficient and can adapt to new information and changing environments. The evidence of

market adaptation suggests that participants adjust their behavior in response to evolving market conditions, contributing to periods of both efficiency and inefficiency.

Third, the application of the EGARCH model highlights the importance of considering asymmetric effects in financial modeling, particularly in emerging markets like Nigeria, where market dynamics can be influenced by both local and global factors. The model's ability to capture these asymmetric volatility responses provides valuable insights into the behavior of the Nigerian FOREX market and the underlying drivers of market volatility.

Overall, this study contributes to the growing body of literature on market efficiency and volatility dynamics in emerging markets. It provides empirical evidence supporting the AMH and highlights the need for adaptive strategies by market participants and policymakers to manage risks associated with foreign exchange volatility. Future research should consider expanding the analysis to other emerging markets, incorporating additional macroeconomic variables, and exploring alternative econometric models to gain a deeper understanding of market behavior and efficiency in different contexts.

In conclusion, the findings underscore the dynamic nature of the Nigerian FOREX market and the importance of adopting adaptive approaches to trading and policy-making. As the market continues to evolve, ongoing research and analysis will be critical to understanding and managing the complexities of market behavior in a rapidly changing global financial landscape.

Based on the findings of this study on the Adaptive Market Hypothesis (AMH) and the detection of price bubbles in the Nigerian FOREX market using the EGARCH model, the following recommendations are proposed:

- i. **Implementation of Risk Management Strategies:** Market participants, including investors, financial institutions, and policymakers, should develop and implement robust risk management strategies to mitigate the impact of periods of high volatility and potential price bubbles. This could include the use of hedging instruments, such as forward contracts and options, to manage exposure to foreign exchange risk.
- ii. **Enhancement of Market Surveillance:** Regulatory bodies like the Central Bank of Nigeria (CBN) and the Securities and Exchange Commission (SEC) should enhance market surveillance to monitor unusual trading activities and detect potential market manipulation or speculative behaviors that could lead to price bubbles. Improved transparency and reporting requirements could help in early detection and prevention of market anomalies.
- iii. **Promotion of Market Education and Awareness:** There is a need to enhance market education and awareness among investors regarding the dynamic nature of market efficiency and the potential for price bubbles. Educating market participants on the risks associated with speculative trading and the importance of making decisions based on fundamental analysis could reduce irrational behaviors that contribute to market instability.
- iv. **Adaptive Policy Frameworks:** Policymakers should adopt adaptive policy frameworks that respond dynamically to changing market conditions. This could involve adjusting monetary and fiscal policies in response to identified periods of high volatility or market inefficiency to stabilize the currency market.

Suggestions for Further Study

- i. **Expanding the Scope to Other Emerging Markets:** Future research could extend the analysis to other emerging markets to compare the behavior of different FOREX markets under the framework of the Adaptive Market Hypothesis. This would provide a broader understanding of how market efficiency and volatility dynamics differ across various economic and regulatory environments.
- ii. **Incorporating Additional Macroeconomic Variables:** Further studies could incorporate additional macroeconomic variables, such as geopolitical events, commodity prices (e.g., crude oil), or global financial conditions, to examine their impact on exchange rate volatility and market efficiency. This would provide a more comprehensive analysis of the factors influencing the Nigerian FOREX market.
- iii. **Exploring Alternative Econometric Models:** While the EGARCH model is effective in capturing asymmetric volatility effects, future research could explore alternative econometric models such as the Markov Switching GARCH model, Copula-GARCH models, or multivariate GARCH models to capture potential nonlinearities and structural breaks in the data more accurately.
- iv. **High-Frequency Data Analysis:** Future studies could utilize high-frequency intra-day data to provide a more granular analysis of volatility patterns and market microstructure effects in the Nigerian FOREX market. High-frequency data could offer insights into the rapid adjustments and information flows that occur within shorter time frames.
- v. **Behavioural Analysis of Market Participants:** Further research could incorporate behavioural finance theories to analyze how investor psychology and sentiment affect market dynamics and contribute to price bubbles. Surveys or experimental studies could be conducted to understand the decision-making processes of various market participants under different market conditions.
- vi. **Impact of Technological Advancements on Market Efficiency:** With the increasing use of algorithmic trading and artificial intelligence in financial markets, future research could examine the impact of technological advancements on market efficiency and volatility in the Nigerian FOREX market. This could provide insights into how technology influences trading behaviors and market outcomes.

By addressing these areas, future studies can provide a more comprehensive understanding of the dynamics of the Nigerian FOREX market and contribute to the ongoing debate on market efficiency in emerging economies.

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